

To: Norris, James E.[james.norris@nist.gov]
From: McGrath, Jesse
Sent: Fri 12/12/2014 3:21:04 PM
Subject: RE: ozone documents
[QA-Handbook-Vol-II.pdf](#)
[QualityAssuranceforAirPollutionmeasuring.pdf](#)

Thanks for the info.

For the annual verifications the memo and results end up in different documents, but it's essentially the same.

I don't think we plot the slope and intercept by run number though, which seems like a good idea.

On our guidance and what we do with it I attached several incarnations of the same document. I've talked to others in the agency, but outside the air program, about this too. Having someone completely external to the agency look at this would really help.

The oldest edition is too large to attach (29 mb) so here's a link to an [online version](#)

General idea

Our uncertainty goals for our ozone data are:

Precision 90% upper confidence limit for coefficient of variation of 7%

Bias 95% upper confidence limit for absolute bias of 7%

We measure these by inserting a known gas every two weeks into the site monitors. The percent differences of those comparisons are used to calculate the bias and precision stats.

How people are using the checks

Based on the attached "QA-Handbook-Vol-II.pdf" Appendix D page 2, paragraph 4, and page 5, line 1 "One Point QC Check" some people are using the results of individual checks to invalidate

data, i.e. if a single check is outside of $\pm 7\%$ they invalidate back to the last check. I can see how they arrive at that interpretation, but to me that's a big problem.

First, you're using your measurement of quality to invalidate data – if you do that you will always appear to meet your quality goals. It's like saying I made 100 cars this year and 10 of them were lemons – I should have a 90% success rate. But if I throw those 10 lemons out 100% of the cars I made this year were good!

Second, the 7% they are using applies to the statistics from the percent differences, not the percent differences themselves. Ozone monitors today can easily beat 7%, but even with a slight bias you'll see individual percent differences outside of that when there's no problem. It's a good idea to look if it's outside of 7%, but you shouldn't invalidate anything unless you find a malfunction or other issue.

Older documents

Looking at the older versions they say not to take the in-or-out interpretation that others use. In the linked version [page 102](#) section 2.0.9.1.3 paragraph (b) it says explicitly not to use the precision and accuracy information to invalidate data. If they indicate a problem you need to look for other sources of error, and you shouldn't invalidate both just to “improve” your QA results. This is the oldest and most complete version of this guidance I've found.

In the attached [QualityAssuranceforAirPollutionmeasuring.pdf](#), which was made after the linked version, you can see that Section 17, page 4, last paragraph has nearly identical wording, but is less clear that you're invalidating the precision and accuracy data because the routine data are invalid, not the other way around. The whole document is shorter and less detailed.

Fallout

It looks like we've lost an important distinction over the years, and we apply this thinking to *all* the pollutants and all of our QC checks, I'm just using ozone as an example. I'd like to get people to understand the difference because it really interferes with our ability to diagnose QA issues and we're also throwing out what is probably good data. Any critique of my interpretation would be helpful.

Thank you,

Jesse

From: Norris, James E. [mailto:james.norris@nist.gov]

Sent: Monday, December 08, 2014 4:57 PM

To: McGrath, Jesse

Subject: ozone documents

Hello Jesse,

Per our conversation, attached is a report from a 6 x 6 verification I performed last year, and the SRP operating Characteristic checkout sheet I currently use.

Regards, Jim

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James E. Norris

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